

THE ASSOCIATION OF COCCIDAE.

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The present paper is intended to give a list of such *Coccidae* as are known to the writer from published or unpublished records to have been found associated together on the same food plant, or in ants' nests, etc. Incomplete as it must be, it will show to some extent the difficulty which accompanies the identification of species of the same genus so found, these being often closely allied.

Furthermore it will be seen how difficult it is to treat the infested plants with insecticides, for as a matter of fact in some instances, the treatment for one would not do for the other, therefore various means have to be adopted.

It has been asked in the writers hearing many times "are varieties produced by the association of two or more species living together on the same food plant." Such questions are usually asked by individuals who having read somewhat superficially the writings of popular authors upon evolution and general biology assume a more perfect knowledge than the entomologist who has made such investigations the study of his life.

So far as I know no varieties have been found in the *Coccidae*, which could be said to have been the result of two or more species living together.

There are however means whereby this could be proved, provided one had the time to devote to it, and the results

would no doubt be of much value to science.

I well remember many years ago while in conversation with Dr. Hagen then at Harvard, what he said to me when I asked him if in his opinion there were any new species of recent origin. His reply was "you will not live long enough to find one." We, of course, are constantly finding and describing new species and varieties; but these we believe have been in existence for a long time but only of recent discovery and are more frequently found in localities which have been little worked up. It would indeed be of much interest if some one would try to find whether or not a male coccid would mate with a female not of its own kin.

The following citations for the most part are records made by Prof. Cockerell although several are from various authors including myself. Some appear here for the first time.

Lecanium pseudhesperidum Ckll. and *Diaspis boisduvalii* Sign. Associated together on *Cattleya* in a greenhouse at Ottawa Canada. The later species *D. boisduvalii* has hitherto been placed in the genus *Aulacispis*. Prof. Cockerell writes me that Mr. Newstead shows that it should be placed in the *Diaspis*.

Lecanium hesperidum L. *Pulvinaria floccifera* West (*P. brassicae*) and *Hemichionaspis aspidistrae* Sign. Cited as

Chionaspis braziliensis Sign. are found together on leaves of an orchid in Trinidad.

Lecanium hesperidum L. and a *Pulvinaria* sp. on leaves of "fitoloca" at Monterey, Mexico.

Lecanium baccharidis Ckll. and *Mytilaspis perlouga* Ckll. on twigs and branches of *Baccharis* at Campinas, Brazil.

Lecanium longulum Dougl. and *L. melaleucæ* Mask. on leaves of *Monstera deliciosa* in the Harvard botanical greenhouse at Cambridge, Mass.

Lecanium sp. *Ceroplastes* sp. young of *Aspidiotus articulatus* Marg. and *A. personatus* Comst. on leaves of *Anacardium occidentale* at Kingston, Jamaica.

Lecanium sp. *Ceroplastes floridensis* Comst. and *Parlatoria* sp. on *Anthurium lanccolatum* at Kingston, Jamaica.

Lecanium mangiferae Green and *Vinsonia stellifera* Westw. on leaves of *Bambosa malaccensis* at Kingston, Jamaica.

Lecanium mangiferae Green. *Saissetia oleæ* Bern. *Ceroplastes floridensis* Comst. *Vinsonia stellifera* Westw. and *Aspidiotus personatus* Comst. on leaves of *Mango* in Manchester square, Kingston, Jamaica.

Lecanium hesperidum L. and *Saissetia oleæ* Bern. on *Hippeastrum equestre* at Kingston, Jamaica.

Eulecanium quercitronis Fitch and *Chionaspis americana* Johns on *Ulmus americana* at Springfield, Mass.

Eulecanium caryæ Fitch and what I take to be *E. persææ* Fabr. on a peach tree at Niagara, Ontario, Canada.

Saissetia oleæ Bern. *Ceroplastes floridensis* Comst. and *C. cirripediformis*

Comst. on *Lignum vitæ* tree at Kingston, Jamaica. *Saissetia hemisphaerica* Targ. and *Orthozia insignis* Dougl. on *Chrysanthemums* at Kingston, Jamaica.

Saissetia hemisphaerica Targ. and *Dactylopius longispinus* Targ. on house fern at Las Cruces, New Mexico.

Saissetia coffeæ? Walk. and *Ceroplastes myricæ* L. in Assam India on tea. *S. coffeæ* may yet be found to be a valid species. I received an adult female scale on leaf of coffee from Mr. Adolph Hempel of Brazil. The scale seems different from those of *S. hemisphaerica* and *S. filicum* but more material must be obtained before a decision can be made.

Saissetia hemisphaerica Targ. and *Aspidiotus aurantii* Mack on *Areca catechu* grown in pots at Cavalieris Penn., Jamaica.

Saissetia hemisphaerica Targ. *Diaspis zamia* Morgan (this is recorded as *Aulacaspis elegans* Leon but Mr. Newstead shows it to belong to the *Diaspis* Cockerell in litt.) and *Dactylopius longispinus* Targ. on *Cycas revoluta* under glass at Springfield, Massachusetts.

Ceroplastes myricæ L. and *Fiorinia theæ?* on tea plant in Assam, India.

Ceroplastes irregularis and *Phenacoccus simplex* King, on *Atriplex confertifolia* and *A. polycarpa?* at Lone Pine, California.

Icerya rosæ and *Ceroplastes depressus* Ckll. found under bark of *Lignum vitæ* tree at Kingston, Jamaica.

Icerya montserratensis and *Ischnaspis longirostris*. Sign on a palm in Trinidad.

Aclerda japonica Newst. and *Antonina socialis* Newst. under the leaf sheath of

Arundinaria japonica under glass, Broxhourne Herth, England.

Ripersia flavola Ckll. and *R. candidata* King, in ants nests in Massachusetts.

Aspidiotus articulatus Morg. *Mytilaspis becki* Newm. and *Chionaspis citri* Comst., on leaves of lime in Trinidad.

Aspidiotus articulatus Morg. and *Chrysomphalus aonidum* L. on orange at Tampico, Mexico.

Aspidiotus yuccarum Ckll. and *Dactylopius dasylirii* Ckll. at the base of leaves of *Yucca elata* at Mesilla Park, N. M.

Aspidiotus ancytus Putn. and *A. fernaldi* Ckll. on *Gleditschia triucanthos* in Charlesbank Park, Mass.

Aspidiotus hederæ Vall. and *Diaspis zamiae* Morgan, on *Cycas revoluta* in a greenhouse at Lawrence, Mass.

Aspidiotus personatus Comst. and *Howardia biclavis* Comst. on the skin of orange (fruit) from Colima, Mexico, quarantined at San Francisco, California.

Aspidiotus cryptoanthus and *Asterolecanium variolosum* Ratz. var. *japonicum* Ckll. on *Quercus glandulifera* from Japan.

Aspidiotus orientalis Newst and *Cero-plastes myricæ* L. on *Cycas revoluta* in Assam, India.

Aspidiotus candidulus Ckll. and *Xerophilaspis prosopidis* on leaves and twigs of *Prosobis velutina* at Tuscon, Arizona.

Aspidiotus forbesi Johns and *A. ancytus* Putn. on crab apple and plum in Kansas.

Aspidiotus aurantii Mask. and *Asterolecanium variolosum* Ratz recorded as a *Planchonia* on oak at Sidney, New South Wales.

Aspidiotus personatus Comst. and *Chrysomphalus aonidum* L. on leaves of *Anacardium occidentale* at Kingston, Jamaica.

Aspidiotus aurantii Mask. and *Chrysomphalus aonidum* L. on *Areca catechu* grown in pots at Cavalieris Pen., Jamaica.

Aspidiotus articulatus Morg. and *Cero-plastes floridensis* Comst. on leaves of *Brunfelsia americana* at Kingston, Jamaica.

Aspidiotus articulatus Morg. and *A. personatus* Comst. on *Cassia fistula* at Kingston, Jamaica.

Aspidiotus articulatus Morg. *A. personatus* Comst. *Pulvinaria cupaniæ* Ckll. and *Diaspis* or *Chionaspis* sp. on leaves of *Chrysophyllum cainito* in Manchester Square, Kingston, Jamaica.

Aspidiotus articulatus Morg. *A. personatus* Comst. *Chrysomphalus aonidum* L. and *Cero-plastes floridensis* Comst. on *Ficus* tree in the yard of the Museum at Kingston, Jamaica. All of the four species cited were also found on a young banana tree out of doors in Jamaica.

Aspidiotus articulatus Morg. *A. personatus* Comst. and *Vinsonia stellifera* Westw. on leaves of *Mangifera indica* at Kingston, Jamaica.

Aspidiotus sp. and *Dactylopius longispinus* Targ. on green mangoes at Kingston, Jamaica.

Aspidiotus articulatus Morg. *A. personatus* Comst. and *Chrysomphalus aonidum* L. on leaves of *Nerium oleander* at Kingston, Jamaica.

Aspidiotus articulatus Morg. and *A.*

personatus Comst. on leaves of *Olea hispanica* in the Parade garden in Jamaica and the same species on leaves of *Persea*, also on leaves of *Punica granatum*, *Aralia guilfoylei*, and *Aperba tibourbou* in Jamaica. The same species together with *Asterolecanium* (olim *Asterodiaspis pustulans* Ckll. on leaves of *Capania edulis* at Kingston Jamaica. The same *Aspidiotus* on *Guaiacum officinola* and on leaves of *Erythrina umbrosa* with *Ceroplastes floridensis* Comst., at Kingston, Jamaica. The same three species were found on *Melicocca bijuga* in Jamaica.

Aspidiotus articulatus Morg. *Chrysomphalus aonidum* L. and *Pulvinaria capaniac* Ckll. on *Bignonia magnifica* in Jamaica.

Aspidiotus personatus Comst. *A. articulatus* Morg. and *Chrysomphalus aonidum* L. on *Jasminum pubescens* and *A. personatus* and *A. articulatus* on *Lawsonia inermis* and *Thevetia neriiifolia* at Kingston, Jamaica.

Diaspis arizonicus Ckll. and *Xerophilaspis prosopidis* Ckll. on leaves and branches on *Prosopis velutina*, Wooton near Kellners Ranch several miles west of Phoenix, Arizona.

Diaspis celtidis Ckll. and *Pulvinaria innumerabilis* Rathv. on *Celtis* at San Antonio, Texas.

Mytilaspis glouveri Pack, *Chionaspis citri* Comst. and *Chrysomphalus aoni-*

dum L. on leaves and fruit of orange at Tampico, Mexico.

Mytilaspis bambusicola Ckll. and *Asterolecanium bambusae* Boisd. on stems of bamboo at Campinas, Brazil.

Mytilaspis concolor Ckll. and *Solenophora coloradensis* Ckll. at Canon City, Colorado on twigs and stems of *Atriplex canescens*.

Mytilaspis ulmi L. *Chionaspis furfurus* Fitch and *Phenacoccus dearnessi* King, on an old hawthorn tree at London, Ontario, Canada.

Mytilaspis ulmi L. and *Asterolecanium variolosum* Ratz on oak twigs from Germany.

Mytilaspis becki Newm. and *Aspidiotus articulatus* Morg. on twigs of *Murraya* at Kingston, Jamaica.

Addenda by Professor Cockerell.

On a single guava (*Psidium*) tree at Kingston, Jamaica, I found

Saissetia oleae. *Pulvinaria cupaniac*

“ *hemisphaerica*. *Vinsonia stellifera*
Aspidiotus articulatus. *Chrysomphalus aonidum*

Aspidiotus personatus. *Ceroplastes floridensis*.

Rhipersia fimbriatula and *R. confusella* together in nests of *Lasius* at Las Vegas, N. M.